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Forest Pest Management Report

3400

FOREST INSECT & DISEASE
CONDITIONS IN ALASKA
1986

FOREST INSECT & DISEASE CONDITIONS IN ALASKA

R-10, 1986

3400

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EXPERIMENT STATION

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FOREST INSECT AND DISEASE CONDITIONS IN ALASKA (R-10)
1986

CONDITIONS IN BRIEF

Spruce bark beetle activity dramatically increased throughout Alaska during 1986. Aerial surveys detected almost 370,000 acres of white, Lutz, and Sitka spruce mortality. Infested areas include old, on-going, as well as new infestations. Substantial spruce beetle caused mortality has appeared for the first time north of the Alaska Range along the Yukon River south of Galena. After three or more consecutive years of endemic engraver beetle activity in interior Alaska, Ips populations rapidly built-up and have caused extensive patches of white spruce mortality scattered over 17,000 acres near Fairbanks.

Spear-marked black moth populations decreased once again throughout the interior: 19,000 acres of paper birch defoliation were detected. Large aspen tortrix populations increased over levels noted in 1985: 347,000 acres of defoliated aspen were detected this year vs. 3,000 acres defoliated in 1985. Approximately 12,000 acres of paper birch were moderately defoliated by leaf rollers on the westside of Cook Inlet and 21,000 acres of river bottom willow were severely defoliated along the Mulchatna and Yukon Rivers.

In southeast Alaska, the hemlock sawfly remained the most significant forest insect pest in 1986. The total area of damage declined from 28,000 acres in 1985 to 18,000 acres in 1986. Most of this acreage consisted of residual damage (top-kill and tree mortality) from previous infestations. Small pockets of new sawfly defoliation totalling 8,000 acres were detected throughout southeast Alaska, predominantly on and near Prince of Wales Island. The spruce beetle continued to expand in Glacier Bay National Park, but appeared to be less active than in previous years. Nearly 18,000 acres have been affected in the Park. The cottonwood leaf beetle was a prominent defoliator of cottonwoods and willows around Juneau and Haines, with damage noted on about 560 acres.

Hemlock dwarf mistletoe, wood decays, and Alaska-yellow cedar decline are currently the most important diseases of old-growth forests in Alaska. More than 200,000 acres of dead and dying stands of Alaska-yellow cedar occur in southeast Alaska. Hemlock canker, caused by Xenomeris abietis, killed small hemlocks and the lower branches of larger hemlocks in old-growth stands along 31 miles of roads on Prince of Wales Island. Several foliage, twig, and stem pathogens attack the commercially important western hemlock-Sitka spruce young-growth forests of southeast Alaska, but this year none caused appreciable damage. Inonotus tomentosus and an unidentified basidiomycete cause serious root and butt decays of live Lutz spruce on the Kenai Peninsula. Canker and stem diseases are destructive on birch, aspen, and other hardwoods in the interior of Alaska.

Porcupines and bears cause significant damage to trees in Alaska.

STATUS OF INSECTS

SPRUCE BEETLE, Dendroctonus rufipennis (Kirby)

Alaska spruce beetle infestations increased by 28% from levels infested in 1985; on-going as well as new infestations now cover approximately 370,000 acres throughout Alaska. This increase was most apparent in interior Alaska where 63,000 acres of white spruce are infested.

White, Lutz, and Sitka spruce mortality continues on approximately 40,423 acres of the Chugach National Forest; a slight increase over the area infested in 1985. Increased beetle activity however, is apparent in the Cooper Landing - Russian River areas. Infestations will continue to expand and intensify in these areas.

Spruce beetle activity is still on-going on the Kenai National Wildlife Refuge where 54,668 acres are currently infested; the majority of the infested acres occur in the Mystery Hills and Skilak Lake areas. However, these infestations are losing their intensity as the amount of susceptible host material has declined. Infestations are declining along the Fox River drainage near Homer where 400 acres of infested spruce are scattered over 7,000 acres. Spruce beetle activity increased dramatically along Kachemak Bay across from Homer. Scattered infestations now cover 3,660 acres. The 200 acre infestation detected in 1985 near Mallard Bay within Kachemak State Park has now expanded to 1,168 acres.

An additional 1,300 acres of scattered spruce mortality occurs northeast of Mallard Bay near Bear Cove. Also, spruce mortality is scattered over 500 acres north of Seldovia; as a result of road clearing. Approximately 10,000 acres of what appears to be scattered spruce beetle mortality is occurring in the Ninilchik River and Crooked Creek areas as well as northeast of Clam Gulch.

Spruce beetle caused mortality of white spruce, Kenai Peninsula

Spruce beetle activity in the Anchorage Bowl and Chugiak-Eagle River areas is still apparent although decreasing in intensity. The area of most activity occurs on the Fort Richardson Military lands where 5-10,000 acres of scattered mortality is evident throughout the spruce-hardwood type.

On the west side of Cook Inlet, scattered spruce beetle activity was detected on approximately 100,000 acres. Most of this mortality is widely scattered and occurs to the west and north of Little Mt. Susitna and to the west of Beluga Mountain.

Spruce beetle activity is increasing in other localities in south-central and interior Alaska. The on-going Tiekel River outbreak along the Richardson Highway now covers close to 20,000 acres. Areas most heavily infested occur along the Tiekel River and along the Richardson Highway from Stuart Creek to Pump Station 12. Aerial detection surveys noted scattered white spruce mortality along the Yukon River south of Galena. This mortality is spread along 50 miles of river and encompasses 63,000 acres. A ground check revealed spruce beetle as the causal agent. This is the first time that standing spruce has been successfully attacked by the spruce beetle north of the Alaska Range. It appears that the spruce became stressed as a result of spring flooding of the Yukon River for at least two years. An evaluation of the infested area is planned for 1987.

In southeast Alaska, almost all of the present spruce beetle activity is concentrated in Glacier Bay National Park. Nearly 18,000 acres have been affected in the Park, with mortality ranging from 5 to 75% of the trees in the nearly pure stands of Sitka spruce. For the second consecutive year, beetle activity was low, as inclement weather prevented large beetle flights.

Elsewhere in southeast Alaska, light spruce mortality has occurred near areas of old blowdown. Most notably, spruce mortality was observed in Yakutat on the eastern edge of a salvage unit. Many of the dead trees near the salvage area contained spruce beetle broods indicating that this mortality has occurred recently. Other small patches of dead spruce near windthrow were visible on Sokolof and Pocket Islands (near Mitkof Island). No current spruce beetle activity was noted along the Taku, Whiting, Chilkat and Klehini Rivers, where beetles have been active in the past.

1986 spruce beetle infestations by ownership are as follows: National Forest Land -- 40,743 acres; State and Private -- 190,350 acres and other Federal lands (e.g. Kenai National Wildlife Refuge, National Parks, etc.) -- 137,245 acres.

ENGRAVERS, Ips perturbatus (Eichh.)

Engraver populations dramatically increased in 1986: 17,000 acres of scattered spruce mortality occurred on State lands near Fairbanks. Ips populations apparently built-up in broken tops resulting from heavy snow loads during the 1984-85 winter. Spring and summer weather in 1986 was drought-like which further stressed the white spruce and provided favorable dispersal and breeding conditions for engraver beetles. The Alaska Department of Natural Resources is planning sanitation and salvage sales throughout the most heavily impacted areas.

HEMLOCK SAWFLY, Neodiprion tsugae (Midd.)

The hemlock sawfly continued to be the most significant insect pest in southeast Alaska in 1986. The total affected area declined substantially for the third consecutive year, with 18,000 acres of damage being mapped in 1986. Most of this acreage (9880 acres) represents scattered to heavy top-kill and tree mortality which resulted from previous sawfly infestations, predominantly in 1983. Some areas which were mapped with moderate defoliation in 1985 now show top-kill or scattered tree mortality. These include Thom's Creek (Wrangell Island), Port Stewart (Cleveland Peninsula), Saginaw Bay (N. Kuiu Island), Todd and Gypsum (Chichagof Island), and Hobart Bay. The evidence of old top-kill and mortality is still most pronounced on northern Dall Island from View Cove to Breezy Bay and in Skowl Arm between Polk Inlet and McKenzie Inlet.

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Sawfly defoliation was noted in some new areas in 1986, while many previously defoliated areas showed excellent recovery. Several locations on and near Prince of Wales Island sustained light to moderate defoliation, including Thorne Island, Coffman Cove, Luck Lake, Kasaan Peninsula, Moira Sound, upper Hetta Inlet between Deer Bay and Beaver Creek, and Craig. Elsewhere in the Ketchikan Area, small patches of defoliation were noted on eastern Kosciusko Island, Heceta Island, Helm Bay, and Port Stewart. In the Stikine Area, new sawfly defoliation was most prominent in Anita Bay (Etolin Island), and on northern Deer Island. On the northern end of Kuiu Island the total defoliated acres declined from 9000 in 1985 to less than 1000 in 1986. Virtually all of the new pockets of sawfly defoliation in 1986 were less than 300 acres in size and were widely scattered.

Information from the larval survey also substantiated the general decline of hemlock sawfly in most parts of southeast Alaska. Although larvae were found on 75% of the ground plots, the total numbers were about one-third of the numbers collected in 1985. The most significant declines in larval numbers were noted at High Island (Rocky Pass) and other Stikine Area locations including Security Bay, Duncan Canal, Port Camden, and Kadake Bay. Substantially fewer sawfly larvae were also collected on Chichagof Island plots including Pavlof Harbor, Todd, Trap Bay, and Port Frederick. Other areas with reduced larval counts were Saks Cove (Behm Canal), Thorne Bay, and Edna Bay as well as most locations on Admiralty Island. We noted increases in sawfly larvae in some areas on the east side of Prince of Wales Island (Thorne Island. Moira Sound, McKenzie Inlet, Dora Bay).

Although the hemlock sawfly infestation has decreased substantially from peak years in 1983 and 1984, we expect to see localized pockets of infestation continuing in 1986, with greatest likelihood of expansion in the southern half of the Forest.

WESTERN BLACK-HEADED BUDWORM, Acleris gloverana (Walsingham)

Populations of the western black-headed budworm remained at very low levels in 1986. The only visible defoliation in southeast Alaska was a small 80-acre patch on the north end of Tuxekan Island in a young-growth stand of spruce and hemlock. Larval survey numbers were comparable to 1985, and budworms were found on about 30% of the ground plots. The most substantial increases in budworm larvae were noted on some southern plots including Coning Inlet (Long Island) and Grace Harbor (Dall Island). The most dramatic declines in larval numbers were at Hood Bay (Admiralty Island) and Hoonah (Chichagof Island).

SPRUCE BUDWORM, Choristoneura sp.

In southeast Alaska, light budworm defoliation was noted near Haines. About 240 acres of river-bottom Sitka spruce were affected in the Kelsall River drainage.

No C. orae defoliation was noted in the Copper Center and Chitina areas in south-central Alaska. However, we may have increased budworm activity in these areas next year as C. orae exhibits a high percentage of second diapause. Larger instars will be prevalent unless we experience an unusually cool and late spring.

COTTONWOOD LEAF BEETLE, Chrysomela sp.

In southeast Alaska, the cottonwood leaf beetle reached its highest population levels in many years. Defoliation was evident on cottonwoods and willows throughout the Mendenhall Valley near Juneau and on the same hosts near Haines. Over 500 acres of moderate to heavy defoliation were mapped along the Chilkat and Klehini Rivers and in northern Lynn Canal near Sullivan Island.

The southeast Alaskan species of leaf beetle were recently identified as Chrysomela aeneicollis (Schaeffer) and C. falsa x aeneicollis.

LARGE ASPEN TORTRIX, Choristoneura conflictana (Wlkr.)

After three consecutive years of decline, tortrix populations dramatically increased in 1986 resulting in almost 350,000 acres of defoliated quaking aspen. Major areas of defoliation occurred in interior Alaska especially around Fairbanks. Tortrix populations remained at low levels throughout south-central Alaska. Defoliation levels are expected to remain high through 1987. However, little aspen mortality is expected.

Aspen defoliated by the large aspen tortrix

SPEAR-MARKED BLACK MOTH, Rheumaptera hastata (L.)

Black moth populations continued to decline throughout interior Alaska. Only 19,000 acres of defoliated birch were aerially detected last summer vs. 315,000 acres defoliated in 1984. The largest defoliated areas occurred southwest of Bettles. Populations are expected to further decrease in 1987.

LEAF ROLLERS, Epinotia solandriana (L.)

Similar to last year, moderate leaf roller defoliation was observed on 11,231 acres of paper birch on the west side of Cook Inlet. Continued defoliation is expected in this area for the next few years.

GYPSY MOTH, Lymantria dispar (L.)

The gypsy moth was introduced from Europe into eastern U.S. about 1866; since then it has become widely distributed throughout New England and has recently been introduced into the Pacific Northwest. This insect has caused widespread damage to forest and urban trees especially in New England.

Last summer in Juneau, two larvae and one male pupa were discovered on recently shipped household goods coming from the east coast. A thorough check of the surrounding areas did not uncover additional specimens. Pheromone traps were subsequently placed throughout southeast Alaska and along the major highways and in campgrounds throughout south-central and interior Alaska. No adult gypsy moths were trapped. An increased trapping program will be undertaken in 1987.

WILLOW DEFOLIATION, Tortricidae

Approximately 20,00 acres of heavily defoliated willow was aerially detected throughout southwestern and interior Alaska. The areas most heavily impacted occurred near the confluences of the Mulchatna and Nushagak Rivers and the Yukon and Koyukuk Rivers. The causal agent has yet to be identified but appears to be a tortricid larva.

Willow defoliated by tortricid larvae

HEMLOCK DWARF MISTLETOE, Arceuthobium tsugense (Rosendhal) G.N. Jones

Hemlock dwarf mistletoe infests stands of western hemlock throughout southeast Alaska as far north as Haines. Hemlock stands vary in their level of infestation; dwarf mistletoe is absent in some stands but in other stands almost every hemlock is infected. Sitka spruce and mountain hemlock are only rarely infected in southeast Alaska. Heavily infected western hemlock trees may have branch proliferations (witches-brooms), bole deformities, and slowed radial growth; sometimes these heavily infected trees die.

Infected, non-merchantable hemlock trees are sometimes left standing in cut-over areas. The spread of dwarf mistletoe from these infected residuals is probably the principle form of infestation of young hemlock stands. A demonstration area near Thorne Bay on Prince of Wales Island, Alaska has been developed to provide information on the recognition, biology, impact, and recommended silvicultural techniques for managing hemlock dwarf mistletoe in young-growth stands. The killing of infected residual hemlocks (by girdling or felling) and the care in laying out cutting boundaries to avoid infected old-growth hemlock on clearcut perimeters can help reduce the initial spread to young stands.

This year, a species of Nectria was found attacking swollen hemlock branches that were infected with dwarf mistletoe. This fungus may kill dwarf mistletoe infections and thereby serve as a biological control for this important forest disease.

Dwarf mistletoe on old-growth western hemlock

SIROCOCCUS SHOOT BLIGHT, Sirococcus strobilinus Pruess.

The incidence of Sirococcus declined somewhat from last year's high infection levels, although this fungus is still causing damage in some young-growth stands. Sirococcus attacks the shoots of western hemlock and, to a lesser degree, the shoots of Sitka spruce. It is indigenous to southeast Alaska. Young hemlocks in thinned stands have fewer infections (than in unthinned stands) and most infections are concentrated in the lower portions of the live crown where they have less effect on tree growth and do not distort the terminal leader.

SHOOT BLIGHT OF ALASKA-YELLOW CEDAR, Apostrasseria sp.

This disease is caused by a newly discovered fungus that is common in naturally regenerating Alaska-yellow cedar (Chamaecyparis nootkatensis) throughout southeast Alaska. Terminal and lateral shoots are killed back 10 cm or so on seedlings and saplings. Growth rates of affected cedars are probably not significantly reduced unless trees are severely attacked. Mature tees were found to be uninfected by this fungus in an intensive survey of diseases of Alaska-yellow cedar. This year, some 2,000 seedlings of Alaska-yellow cedar seedlings were planted on Etolin Island (near Wrangell) to evaluate if Apostrasseria will attack planted seedlings and to determine if the incidence of disease is different on seedlings in a variety forest types.

Shoot blight of Alaska-yellow cedar caused by Apostrasseria sp.

SPRUCE NEEDLE CAST, Lirula macrospora (Hartig) Darker

This year, spruce needle cast occurred at about the same level on Sitka spruce in southeast Alaska as the previous year. Spruce growing in young-growth stands are commonly infected, but most needles are shed in the lower portion of the crown where the fungus has less apparent impact on the trees' height and radial growth. Young, emerging spruce needles are probably infected in early spring, but these needles do not exhibit symptoms until the following year. When these needles are two years old, they become light brown (necrotic),

White spruce and Lutz spruce had higher than average infection levels of needle cast on the Kenai Peninsula and in forested areas north of Anchorage. Mortality of some trees occurred, but factors other than Lirula may have contributed to tree death.

SPRUCE NEEDLE RUST, Chrysomyxa ledicola Lagerh.

Spruce needle rust was somewhat less abundant than last year in southeast Alaska. The spores that infect spruce needles are produced on the alternate host -- Labrador-tea (Ledum spp.), a plant that is common in boggy areas. Therefore, only spruce in or near boggy areas are moderately or heavily infected. Since only the current-year's needles are susceptible to infection, spruce trees must be attacked for several consecutive years for heavy defoliation to occur. Mortality is rare.

SPRUCE BROOM RUST, Chrysomyxa arctostaphyli Diet.

Spruce broom rust is a chronic disease of white and Lutz spruce; its incidence changes little from year to year. It is common wherever spruce grows near the alternate host, bearberry or kinnikinnik (Arctostaphylos uva-ursi). The rust fungus causes perennial infections that result in large, dense clusters of branches. Top kill or mortality sometimes occur. Radial growth of infected spruce trees may be affected.

HEMLOCK NEEDLE RUST, Pucciniastrum vaccinii (Rab.) Joerst.

Hemlock needle rust occurred at low levels on western hemlock this year, but the alternate host, blueberry (Vaccinium alaskensis How.), was more heavily infected than in previous years. The spores that infect hemlock needles are produced on blueberry; thus this could result in higher-than-average infection levels on western hemlock next year. The incidence of this needle rust will be closely monitored.

WESTERN GALL RUST, Endocronartium harknessii (J.P. Moore) Hirat.

Endocronartium continues to cause spherical galls on branches and main boles of shore pine (Pinus contorta). This year, another fungus, Nectria macrospora, colonized and killed many of these galls on pines in the Gustavus and Juneau areas. The result of Nectria attack is death of limbs from the gall outward.

FOLIAGE DISEASES OF CEDARS, Gymnosporangium nootkatense Arth. and Didymascella thujina (Durand) Maire

Gymnosporangium on Alaska-yellow cedar and Didymascella on western redcedar occurred at low, endemic levels this year. They neither severely defoliated nor killed cedar trees.

HEMLOCK CANKER, Xenomeris abietis Barr.

The incidence of hemlock canker was lower this year than for the several previous years. Xenomeris killed small hemlocks and the lower crowns (up to 40 feet from the ground) of larger hemlocks along some 31.8 miles of roads on Prince of Wales Island. Infection results in death of the cambium or, when branchlets and branches are not girdled, resinous cankers form. Few hemlocks died this year, but hemlocks killed during preceeding years are still evident. In some affected stands, nearly every hemlock seedling was dead, except for those less than one-year old. Spruce was unaffected in these stands. This disease occurred an average distance from roads of 130 feet, but extended up to 300 feet from roads in some cases. Accounting for disease on both sides of roads, an estimated 668 acres were affected on Prince of Wales Island. Unless this disease begins to seriously affect mature hemlock trees or to infest hemlock in second growth stands, it will not cause significant damage.

The following is a breakdown of the incidence of hemlock canker along portions of the road system on Prince of Wales:

Klawock-Craig area	10.9 miles
Thorne River-Control Lake area	3.9 miles
Sarkar Lake area	3.4 miles
Neck Lake area	2.2 miles
Red Bay area	4.3 miles
Labouchere Bay-Alder Creek area	6.1 miles
Total	30.8 miles

CANKER OF WHITE AND LUTZ SPRUCE, Therrya sp.

Perennial cankers were found on branches and main stems of white and Lutz spruce in the Anchorage area and on the Kenai Peninsula. Branches or main stems die from complete girdling, or more commonly perennial cankers develop. Perennial cankers sometimes form a target-shape appearance when, each year, the tree responds to infection by producing callus growth and pitch around the dead portion only to have the fungus later kill this new growth. This results in an expanding series of dead callus folds as the canker enlarges over 10 or more years. Small black, disc-shaped fruiting bodies of Therrya form on the periphery of the dead tissue. This disease appears to most common in suppressed spruce. Its distribution throughout Alaska is not known.

CANKER OF MOUNTAIN ASH, Valsa sp.

This disease, sometimes known as Cytospora Canker because of the asexual spore stage of the causal fungus, killed ornamental saplings of mountain ash in the Anchorage area this year. Numerous saplings planted in landscapes and at nurseries were killed. Some form of stress (e.g., drought or planting shock) usually weakens plants before this fungus can kill small trees.

ALASKA-YELLOW CEDAR DECLINE

Decline and mortality of Alaska-yellow cedar persists as one of the most important forest diseases in southeast Alaska. Some 206,000 acres of decline have been mapped during aerial detection surveys. More Alaska-yellow cedar trees died this year than in the preceeding several years, but some trees have probably died throughout southeast Alaska every year since the onset of the problem about 100 years ago. This year, dying, discolored trees were particularly concentrated on the east side of Lindenberg Peninsula on Kupreanof Island and the northeast portion of Slocum Arm on Chichagof Island. The patterns of tree death and apparent absence of a pathogen as the primary incitant suggest that some form of environmental stress may be the cause of the problem.

The following list of acreage of land affected by Alaska-yellow cedar decline has been calculated from a composite map developed from mapping dead and dying cedar during annual aerial detection surveys conducted over the previous 20 years. This is the first time that these figures are presented, and they should not be compared to the low acreages reported in previous years with the idea that there has been a startling increase in the acreage of land affected by cedar decline. Acreages reported for cedar decline in previous years included only areas exhibiting red trees seen from the air during that year. Recent research suggests that the total acreage of cedar decline increases very slowly because there is no site-to-site spread of decline. The slow increase in area of cedar decline is a result of encroachment of existing mortality on adjacent stands. Contained within most declining stands are trees that died up

to 100 years ago, more recently killed cedars, dying cedars (with red or thin crowns), healthy cedars, and trees of other species.

Alaska-yellow cedar tree that died from the decline syndrome

ACREAGE OF DEAD AND DYING ALASKA-YELLOW CEDAR
IN SOUTHEAST ALASKA

	Acres
NATIONAL FOREST LAND	197,876
Chatham Area	55,424
Juneau Ranger District	466
Hoonah Ranger District	778
Sitka Ranger District	
Chichagof I.	22,575
Baranof I.	23,353
Kruzof I.	4,048
Total	49,976
Admiralty Island Nat'l Monument Wilderness	4,515
Stikine Area	93,723
Petersburg Ranger District	
Kupreanof I.	38,922
Kuiu I.	22,107
Mitkof I.	2,802
Woewodski I.	1,246
Mainland	3,581
Total	68,658
Wrangell Ranger District	
Etolin I.	8,251
Wrangell I.	8,096
Zarembo I.	4,826
Woronofski I.	311
Mainland	3,581
Total	25,065
Ketchikan Area	58,226
Thorne Bay Ranger District	
Prince of Wales I.	12,144
Kosciusko I.	2,958
Heceta I.	467
Total	15,569

Craig Ranger District
- Prince of Wales I.....8,718
- Dall I. and Long I.....467
- Total.....9,185

Ketchikan Ranger District
- Revillagigedo I.....3,736
- Gravina I.....311
- Mainland.....7,006
- Total.....11,053

Misty Fjords Nat'l Mon. Wilderness
- Revillagigedo I.....623
- Mainland.....12,299
- Total.....12,922

NATIVE LAND.....5,605

- Prince of Wales I.....1,713
- Kupreanof I.....2,647
- Ketchikan area.....1,245

STATE LAND.....3,270

- Sitka area.....1,090
- Mitkof I.....934
- Kupreanof I.....156
- Prince of Wales I.....476
- Ketchikan area.....623

TOTAL LAND AFFECTED.....206,751

DIEBACK OF WHITE AND LUTZ SPRUCE

The lower branches of white and Lutz spruce died this year on the Kenai Peninsula (particularly near Soldotna), the Anchorage area, and near Fairbanks. In severe cases, trees were killed. Symptoms suggest a possible needle disease or branch canker. Needle pathogens that were found included: Lirula macrospora, Lophodermium sp., Rhizosphaera sp., Chrysomyxa ledicola, and a snow mold. None of these needle pathogens were causing appreciable damage, however. Symptoms appear to be similar to Cytospora canker of spruce reported from eastern U.S. and Canada, but this fungus has not yet been found. The cause of branch mortality is unknown and will be investigated next spring.

HEMLOCK FLUTING

Fluting on the boles of western hemlock continues to be a problem throughout southeast Alaska. Hemlocks with fluting have deeply incised grooves and ridges extending vertically along their boles; a condition that reduces the value of hemlock logs because they yield less sawlog volume and bark is contained in some of the wood. The cause of fluting is not known, but researchers are currently exploring reasons for this bole deformation and evaluating its presence in young hemlock stands.

FREEZING INJURY TO HEMLOCK NEEDLES

Last winter (1985-86), the one-year-old needles of many western hemlock trees were damaged by freezing injury in young stands throughout southeast Alaska. This injury was most evident in the spring, when entire needles or portions of needles that froze turned a greenish-brown color. Buds and older needles were unaffected. Damaged needles were later shed, leaving hemlock trees green. Because relatively few needles in only one age class were damaged, unaffected hemlock trees will probably suffer little or no reduction in growth.

DECAYS

Heartrot fungi cause substantial loss of wood volume in Alaskan forests. The problem is particularly acute here in Alaska where long-lived trees in old-growth forests are still largely uncut and the slow-growing decay fungi have ample time to cause significant losses. The following fungi have been shown to cause most of the decay in the forest trees of southeast Alaska:

Sitka spruce-

Fomitopsis pinicola (Schwartz:Fr.) Karst.
Phellinus pini (Thore:Fr.) Pilat
Armillaria sp.
Phaeolus schweinitzii (Fr.) Pat.
Laetiporus sulphureus (Bull. ex Fr.) Bond. et Sing.

Western hemlock-

Fomitopsis pinicola
Armillaria sp.
Heterobasidion annosum (Fr.) Bref.
Laetiporus sulphureus
Phaeolus schweinitzii
Phellinus robustus (Karst.) Bourd & Galz.
Phellinus pini
Echinodontium tinctorium (Ell. & Ev.) Ell. & Ev.

Western redcedar-

Poria albipellucida Baxt.
Phellinus weirii (Murr.) Gilbn.

On the Kenai Peninsula, heartrot fungi of live Lutz spruce have recently been found causing the loss of wood volume and contributing to windthrow in recreation areas. This year, a study was initiated to determine which fungi cause this decay and what portions of spruce trees are attacked. Two fungi, Inonotus tomentosus and an unidentified Basidiomycete, were found causing most of the decay. Both fungi attack the heartwood in the roots and the lower bole of unscarred spruce trees. Besides causing heartrot decay, I. tomentosus was colonizing and apparently killing the sapwood and cambium on the roots of some live spruce trees. In other regions of the U.S. and in Canada, this fungus is sometimes known as a root pathogen where it weakens and kills trees; thus, I. tomentosus could be contributing to the large outbreak of spruce beetle on the Kenai Peninsula.

STATUS OF ANIMAL DAMAGE

PORCUPINE, Erethizon dorsatum

Porcupine damage was noted in several precommercially thinned stands of spruce and hemlock in the Stikine Area. Small patches of girdled trees were evident throughout Mitkof Island, most notably along the Falls Creek Road, Blind Slough, and Ohmer Creek. Additional damage was detected on Wrangell Island south of Chichagof Peak and on the west side of Etolin Island near Steamer Knoll. In Southeast Alaska, porcupine feeding is generally patchy, with groups of 15-30 trees being affected.

BROWN BEAR, Ursus arctos

Brown bears continue to cause basal scars on Alaska-yellow cedar trees on Baranof and Chichagof Islands, particularly in the Peril Strait area. Other tree species are unaffected. Approximately one-half of the cedars in some stands have at least one scar. Trees with old scars have associated columns of wood decay that will limit the value of butt logs from scarred trees.

INTEGRATED PEST MANAGEMENT ACTIVITIES

Integrated pest management has been described as a "systems approach to reducing pest damage to tolerable levels through a variety of techniques, including predators and parasites, genetically resistant host, natural environmental modifications and, when necessary and appropriate, chemical pesticides." Considering the broad parameters offered by this definition a listing of Region 10 IPM activities conducted by FPM is as follows:

(1) A continuation of the testing of a synthetic pulp mill by-product known as pine oil as to its effectiveness in preventing spruce beetle attacks. The pine oil treatments provided adequate control through the first beetle flight; less control through the second major flight in July. Future testing of the pine oil fractions is planned for 1986.

(2) The evaluation of methylcyclohexenone (MCH) in preventing or suppressing spruce beetle attacks on felled white spruce continued in 1986. Results of a field study did not live up to expectations; only a 60% reduction in beetle attacks were obtained.

(3) An evaluation of trap trees treated with a silvicide (MSMA) was again conducted on the Kenai Peninsula in 1986. Uninfested live spruce were treated with a formulation of MSMA, (Daconate 6) and were felled two-four weeks later prior to spruce beetle flight. The results of the study indicated that although the production of beetle brood was reduced by 93% for the two week felling treatment when compared to untreated check trees; no reduction in attack density was apparent.

(4) Participation in a cooperative effort with Alaska Agricultural Research Station and the Cooperative Extension Service to provide pest management information to Alaska residents. The program which includes education, research and survey activities, provides integrated pest management information concerning urban forestry and garden and greenhouse pests. This program includes a Teletip recorded message service as well as an IPM Newsletter which is published on a bi-weekly basis. This is mailed statewide and contains information on pest occurrence and available control measures. The mailing list includes growers, gardeners, professional government agency personnel, and Alaska Master Gardeners who use this information for education purposes.

There were four full-time pest scouts and one half-time pest scout employed from May until September. In addition there are four Extension Agents working with the program. They devote approximately 135 person days to coordination, supervision, and education. The researchers from theForest Service and ARS also contribute time. This amounts to about 85 days a year. They also provide assistance and laboratory facilities for classification of collected pests. These are catalogued and made into displays for Extension Agents to use in future educational programs.

(5) The initiation of a demonstration area in the Granite Creek area of the Chugach National Forest. More than 2,000 acres of spruce/hemlock forests as well as a developed campground have been set aside to promote vegetative management practices for the reduction and prevention of spruce beetle infestations. A variety of disciplines including recreation, fisheries and wildlife, timber, and pest management will be involved in this five year program. A selective cut of the Granite Creek Campground is scheduled for the 1986-87 winter with specific purposes of increasing residual vigor and eliminating those spruce which are highly susceptible to spruce beetle attacks. Future selective cuts have been scheduled as outlined in the Environmental Analysis prepared by the Anchorage Ranger District of the Chugach National Forest.

(6) The installation of a demonstration area for the control of hemlock dwarf mistletoe. The demonstration area, located near Thorne Bay on Prince of Wales Island, demonstrates forest management techniques for minimizing losses from dwarf mistletoe in young-growth hemlock stands.

(7) The testing of two chemicals-Orthene and Pydrin-for the prevention of spruce bud midge attack on spruce regeneration in the Snug Harbor area of the Kenai Peninsula was undertaken in May of 1985. Treatment efficacy conducted in 1986 demonstrated the Pydrin treatment produced satisfactory prevention of bud midge attacks whereas Orthene did not.

1986 FOREST INSECT AND DISEASE INFESTATIONS IN ALASKA BY OWNERSHIP AND PEST IN ACRES

PEST	NATIONAL FOREST	OTHER FEDERAL	NATIVE	STATE & PRIVATE
SPRUCE BEETLE *Dendroctonus rufipennis*	40,743	137,245	60,176	130,174
ENGRAVERS *Ips perturbatus*		396	40	16,869
LARGE ASPEN TORTRIX *Choristoneura conflictana*		14,023	15,608	317,702
SPEAR-MARKED BLACK MOTH *Rheumaptera hastata*		16,736	311	2,102
BLACK-HEADED BUDWORM *Acleris gloverana*	394		273	
LEAF ROLLER *Epinotia solandriana*		467		10,764
HEMLOCK SAWFLY *Neodiprion tsugae*	12,080		5,840	80
WILLOW DEFOLIATION	78	10,064	10,633	1,002
ALASKA-CEDAR MORTALITY (current discoloration only)	240			

TOTAL - INSECT: 807,352 ACRES

TOTAL - DISEASE: 240 ACRES [1]

STATE TOTAL (Insect and Disease): 807,592 ACRES

[1]These values do not include many of the most destructive diseases (e.g., decays and dwarf mistletoe) because these losses are not detectable in aerial surveys. Likewise these values do not include the approximately 200,000 acres of old standing cedar mortality in southeast Alaska.

FOREST PEST
BIOLOGICAL EVALUATIONS, TECHNICAL
REPORTS, MISC. PUBLICATIONS
1986

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Hennon, P.E. 1986. Spruce Needle Rust. USDA For. Serv. Pest Leaflet R10-TP4 6p.

Hennon, P.E. 1986. Pathological and ecological aspects of decline and mortality of Chamaecyparis nootkatensis in Southeast Alaska. Ph.D Thesis, Dept. of Botany and Plant Pathology, Ore. State Univ. 279p.

Hennon, P.E., G.B. Newcomb, C.G. Shaw III, and E.M. Hansen. 1985. Nematodes associated with dying Chamaecyparis nootkatensis in southeast Alaska. Plant Disease 70:352.

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Holsten, E.H. 1986. Preliminary evaluation of an Ips outbreak, Bonanza Creek Experimental Forest. USDA For. Serv., Anchorage, AK (Mimeo). 9p.

Holsten, E.H., P.E. Hennon, and R.A. Werner. 1985. Insects and Diseases of Alaskan Forests. USDA For. Serv. Alaska Region Rep. No. 181. 217p.

Werner, R.A., F. Hastings, E.H. Holsten, and A. Jones. 1986. Carbaryl protects white spruce from attack by spruce beetles (Coleo. Scolytidae) for three growing seasons. J.Econ. Ent. 79:1121-1124.

SUBMITTING INSECTS AND DISEASES FOR IDENTIFICATION

People interested in obtaining positive identification of insect and disease specimens should submit samples to specialists. The following procedures for the collection and shipment of specimens should be used:

Specimen Collection:

1. Adequate material should be collected.
2. Adequate information: The value of an insect or disease specimen depends on the information regarding its collection.
    a. Where the specimen was collected: nearest Post Office or town, elevation, aspect, and so forth.
    b. When the specimen was collected.
    c. Who collected the specimen.
    d. Host description (age, species, and general appearance).
    e. General condition of the surrounding area (fire, blowdown, logging, and so forth).
3. Personal opinion of the problem is very helpful.

Shipment of Specimens:

1. General:
    a. Pack specimens in such a manner that breakage will be minimal.
2. Insects: Specimens sent through the mail should be packed to withstand rough treatment.
    a. Larvae and other soft-bodied insects should be shipped in small screw-top vials or bottles containing at least 70% isopropyl (rubbing) alcohol. Make certain the bottles are sealed well. Include in each vial adequate information, or a code, relating the sample to the written description and information. Labels inserted in the vial should be written on with pencil or India ink. Do not use ball point pen as the ink is not permanent.
    b. Pupae and hard bodied insects may be shipped either in alcohol or in small boxes. Specimens should be placed between layers of tissue paper in shipping boxes. Pack carefully and make certain that there is very little movement of material within the box. Do not pack insects in cotton.
3. Needle Diseases:
    a. Do not ship in plastic bags. Sprinkle lightly with water before wrapping in newspaper.
4. Mushrooms and Conks:
    a. Do not ship in plastic bags. Wrap in paper and ship in a box. Ship immediately in fresh condition, or air dry, then ship.

Shipping:

1. Ship as quickly as possible. If samples cannot be shipped rapidly, store them in a refrigerator.
2. Include address inside shipping carton.
3. Mark: "FRAGILE: INSECT-DISEASE SPECIMENS ENCLOSED; FOR SCIENTIFIC PURPOSES ONLY; NO COMMERCIAL VALUE".

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Please report or submit sample
of forest or urban tree insects or
disease to your local ALASKA
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